

Claims

Having thus described my invention, what I claim as new,  
and desire to secure by Letters Patent is:

1 ~~1. An embedding method for embedding additional~~  
2 ~~watermarking information into the data representing text~~  
3 ~~information as a black and white binary document image,~~  
4 ~~having the steps of:~~  
5 ~~detecting text image area; and~~  
6 ~~modifying the features of said text image area.~~

1 2. A detecting method for detecting additional watermarking  
2 information embedded into a document image by the method  
3 according to claim 1, having the steps of:  
4 detecting text image area; and  
5 extracting the features from said text image area.

1 3. The method according to Claim 1 wherein the feature  
2 comprises either one or a combination of, the number of  
3 black pixels, the transitive number of black and white  
4 pixels, occurrence frequency of any specific local  
5 pattern and average thickness of a line segment.

1 4. The method according to claim 1 wherein the image area  
2 for embedding or detecting said additional watermarking  
3 information is a rectangle circumscribed around a text  
4 line.

1 5. The method according to claim 1 for embedding  
2 additional watermarking information into the data  
3 representing text information as an image, having the  
4 steps of:

5 ~~dividing said embedded text image area into two subblocks~~  
6 ~~vertically and two or more subblocks horizontally;~~  
7 ~~dividing said subblocks into different upper and lower~~  
8 ~~groups; and~~  
9 ~~modifying the features for respective groups to increase or~~  
10 ~~decrease them to one phase or many phases.~~

1 6.The method according to claim 1 for embedding  
2 additional watermarking information into the data  
3 representing text information as an image, having the  
4 steps of:  
5 detecting text image area;  
6 modifying the features of said text image area; and  
7 embedding 1 or more bit of additional watermarking  
8 information into two or more lines.

1 7.A detecting method for detecting additional  
2 watermarking information embedded into the document image  
3 by the method according to claim 6, having the step of  
4 detecting 1 or more bit of embedded additional  
5 watermarking information from two or more lines.

1 8.An embedding method for embedding additional watermarking  
2 information into the data representing text information as  
3 a black and white binary document image, having the steps  
4 of:  
5 detecting text image area;  
6 splitting said embedded text image area into two or more  
7 subblocks;  
8 dividing said subblocks into two or more groups; and  
9 ~~modifying the features for respective groups to increase or~~  
10 ~~decrease them to one phase or many phases.~~

1  
2 9.A detecting method for detecting additional watermarking  
3 information embedded into the document image by the method  
4 according to claim 8, having the steps of:  
5 detecting text image area;  
6 splitting said text image area into two or more subblocks;  
7 dividing said subblocks into two or more groups;  
8 integrating the features detected from subblocks in  
9 respective groups; and  
10 determining the value of said information by comparing the  
11 integrated values of said groups.

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1 10.The method according to claim 8 wherein the feature  
2 comprises either one or a combination of, the number of  
3 black pixels, the transitive number of black and white  
4 pixels, occurrence frequency of any specific local pattern  
5 and average thickness of a line segment.

1 11.The method according to claim 8 wherein the image area  
2 for embedding or detecting said additional watermarking  
3 information is a rectangle circumscribed around a text  
4 line.

1 12.The embedding method according to claim 8 for embedding  
2 additional watermarking information into the data  
3 representing text information as an image, having the steps  
4 of:  
5 dividing said embedded text image area into two subblocks  
6 vertically and two or more subblocks horizontally;  
7 dividing said subblocks into different upper and lower  
8 groups; and

9 ~~modifying the features for respective groups to increase or~~  
10 ~~decrease them to one phase or many phases.~~

1 13.The embedding method according to claim 8 for embedding  
2 additional watermarking information into the data  
3 representing text information as an image, having the steps  
4 of:

5 detecting text image area;  
6 modifying the features of said text image area; and  
7 embedding 1 or more bit of additional watermarking  
8 information into two or more lines.

1 14.A detecting method for detecting additional watermarking  
2 information embedded into the document image by the method  
3 according to claim 13, having the step of detecting 1 or  
4 more bit of embedded additional watermarking information  
5 from two or more lines.

1 15.An embedding device for embedding additional  
2 watermarking information into the data representing text  
3 information as a black and white binary document image,  
4 having the means of:  
5 detecting text image area; and  
6 modifying the features of said text image area.

1 16.A detecting device for detecting additional watermarking  
2 information embedded into a document image, having the  
3 means of:  
4 detecting text image area; and  
5 extracting the features from said text image area.

1 17. An embedding device for embedding additional  
2 watermarking information into the data representing text  
3 information as a black and white binary document image,  
4 having the means of:  
5 detecting text image area;  
6 splitting said embedded text image area into two or more  
7 subblocks;  
8 dividing said subblocks into two or more groups; and  
9 modifying the features for respective groups to increase or  
10 decrease them to one phase or many phases.

1 18. A detecting device for detecting additional watermarking  
2 information embedded into the document image, having the  
3 means of:  
4 detecting text image area;  
5 splitting said text image area into two or more subblocks;  
6 dividing said subblocks into two or more groups;  
7 integrating the features detected from subblocks in said  
8 respective groups; and  
9 determining the value of said information by comparing the  
10 integrated values of said groups.